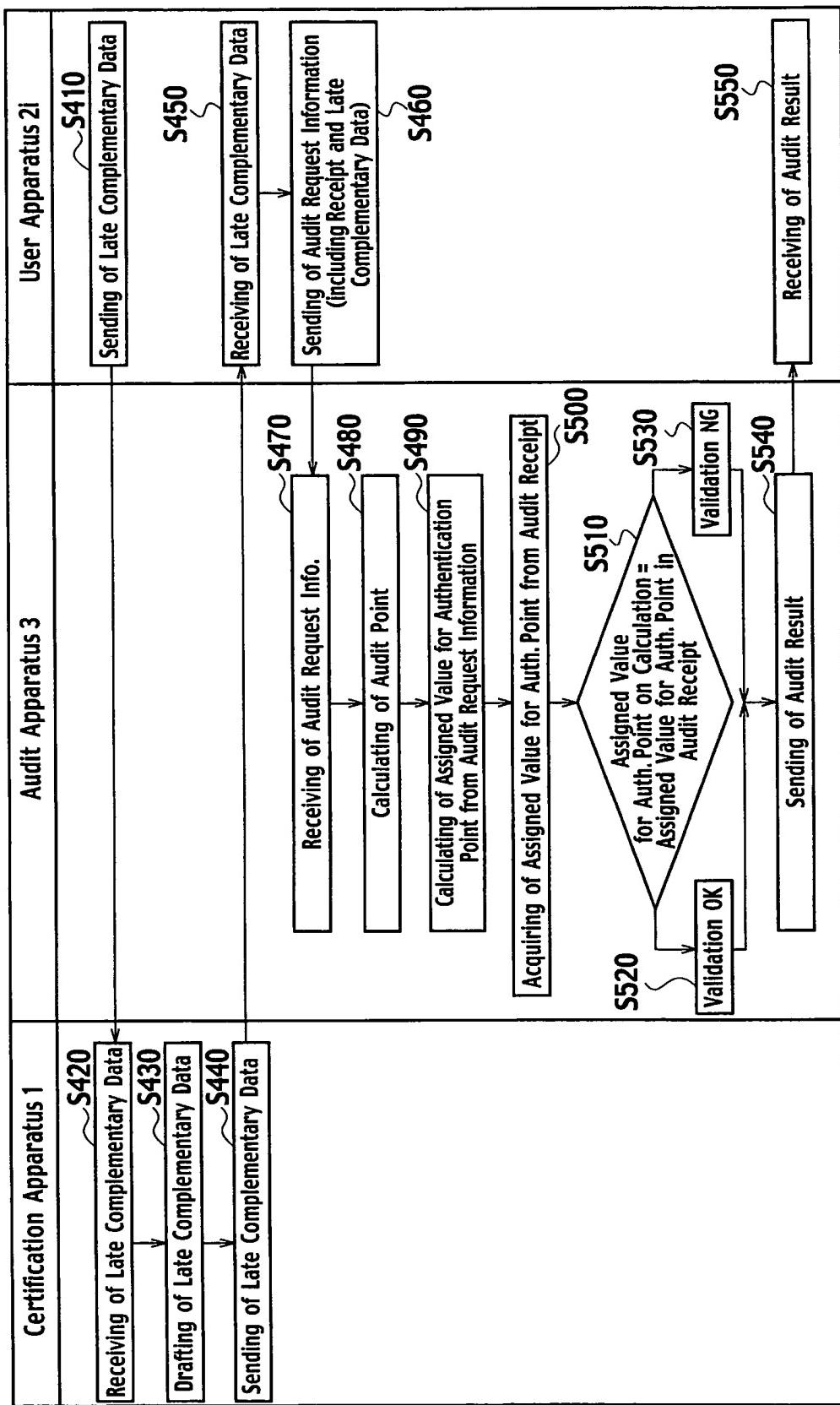


FIG. 10



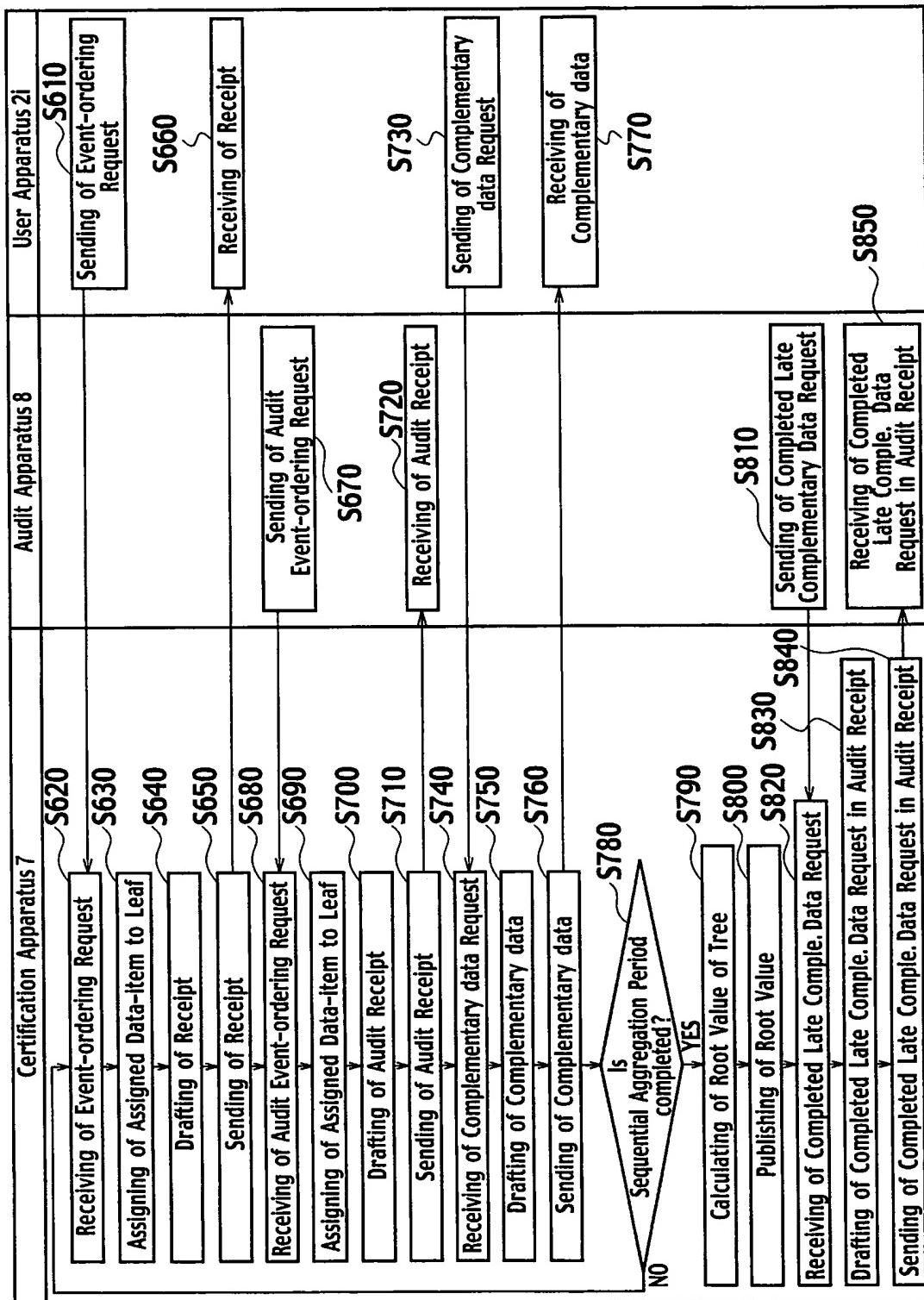
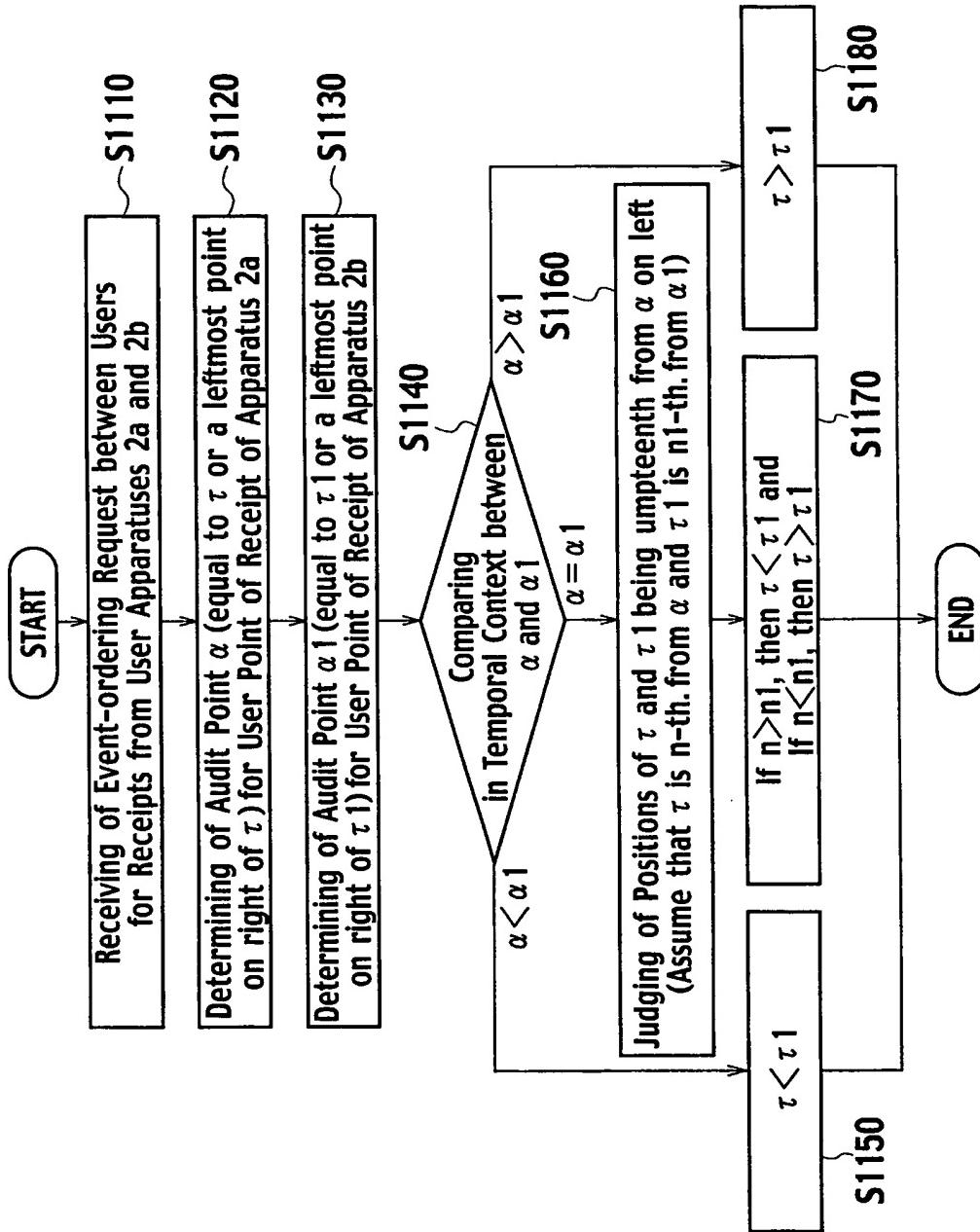


FIG. 15

FIG. 17



18 / 77

FIG. 19

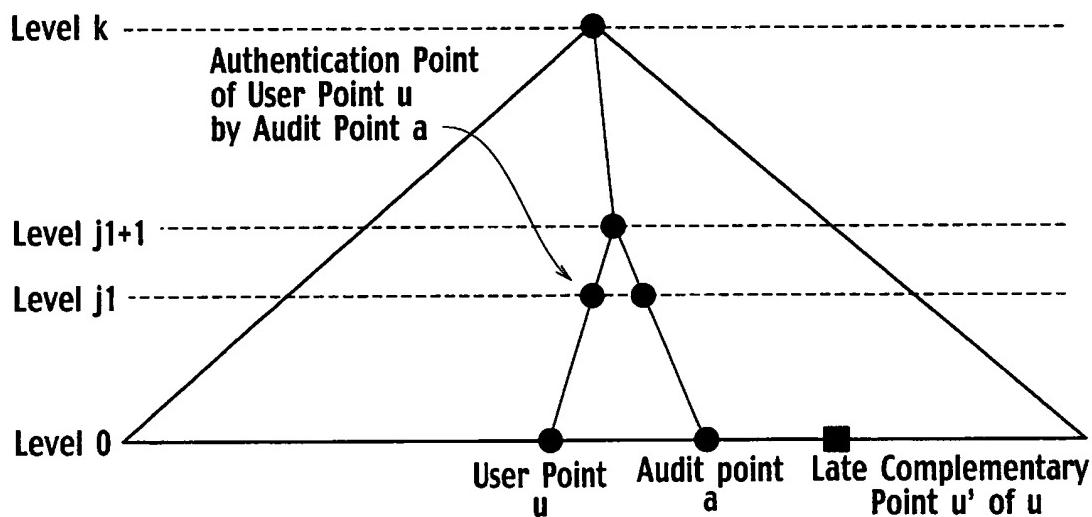


FIG. 20

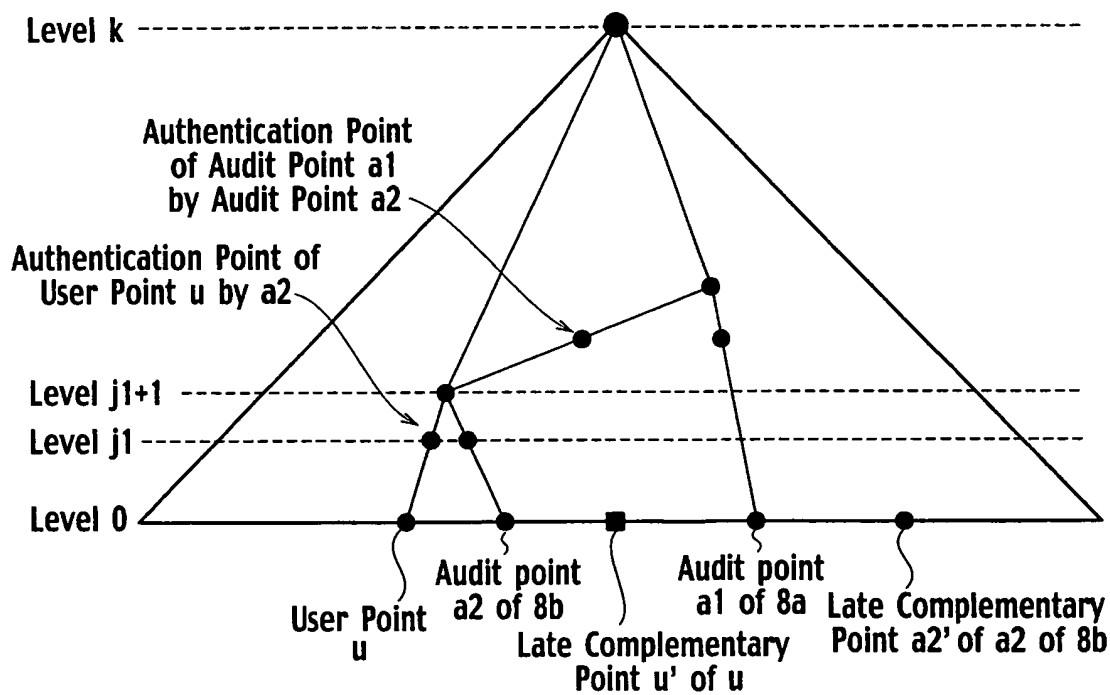


FIG. 24

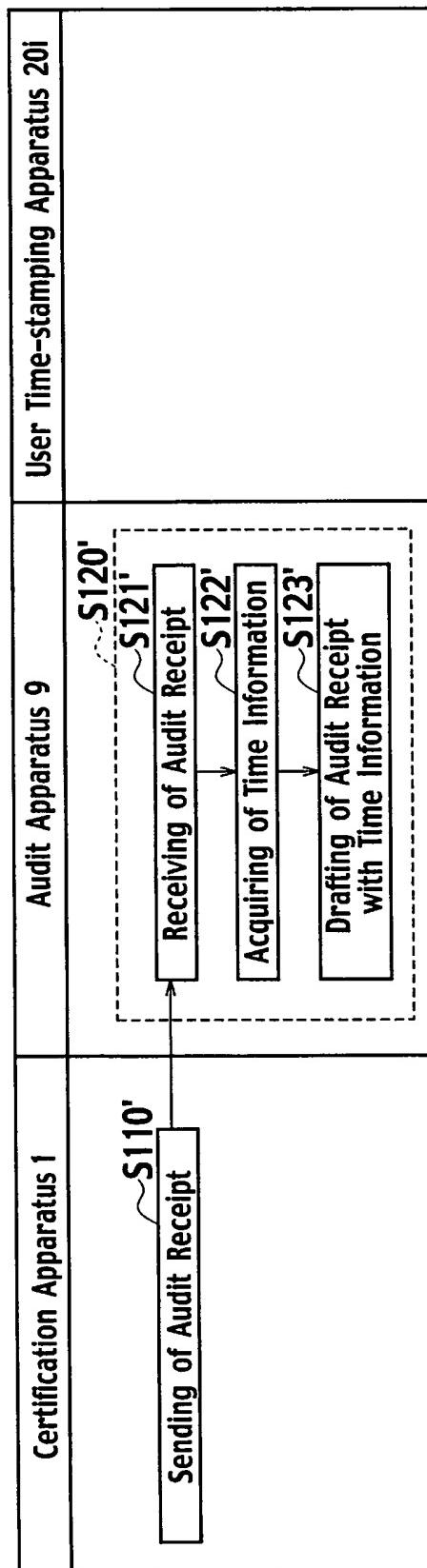


FIG. 25

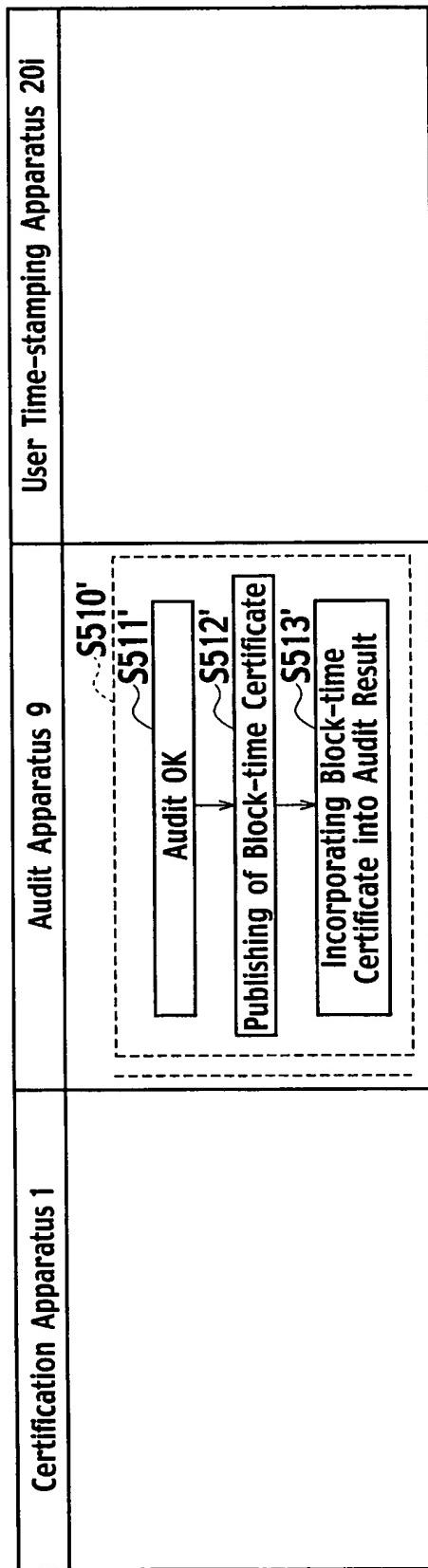


FIG. 27

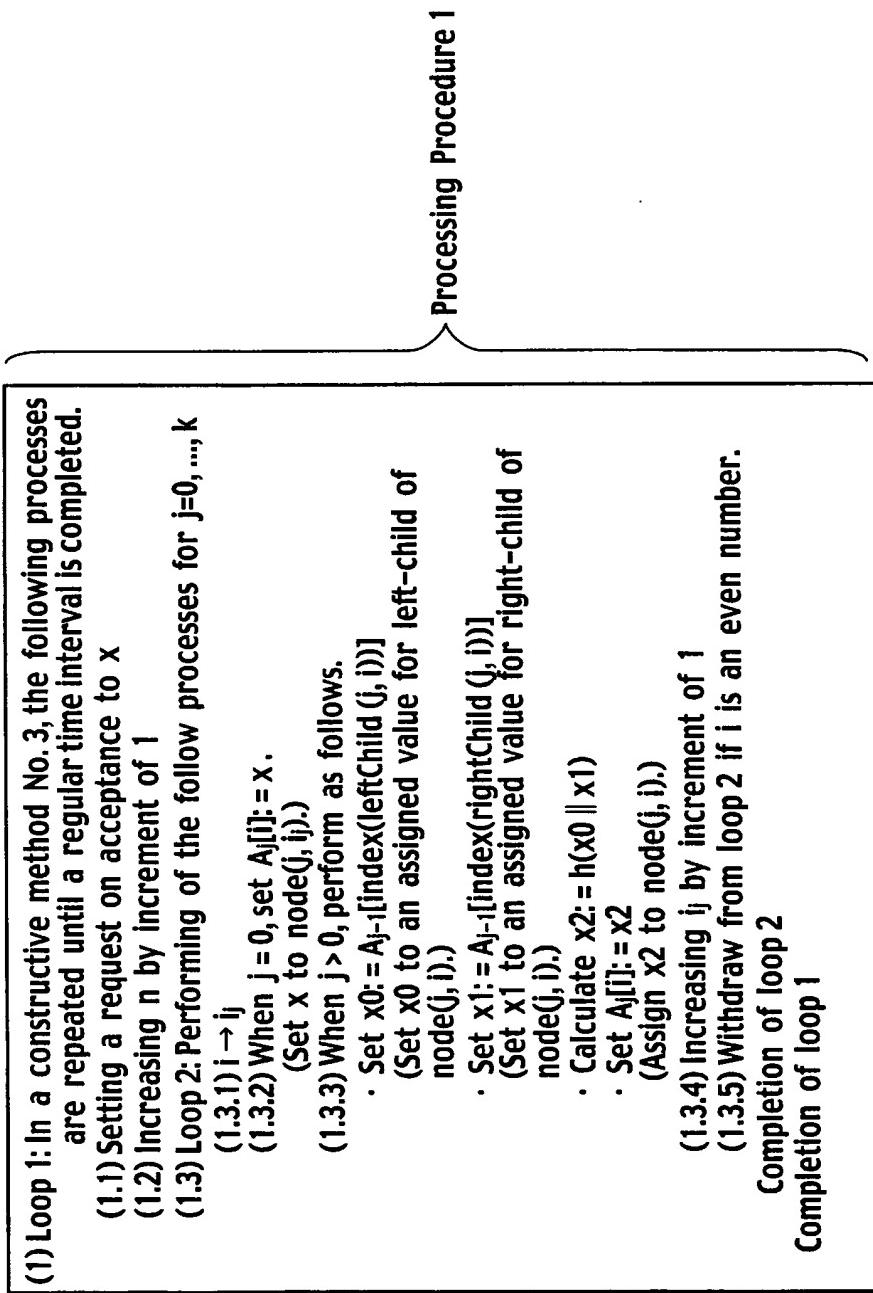


FIG. 28

(2) Performing of the following processes after withdrawing from loop 1 on reaching finish time.

(2.1) Set $k := \text{ceiling}(\log_2(n))$.

(2.2) Calculate $\text{rtPath}(k, 0, n-1)$ and Set $((0, r(0), \dots, k, r(k)))$ to the calculation result.

(2.3) Loop 3: Performing of the follow processes for $j=0, \dots, k$

(2.3.1) $i \rightarrow i_j$

(2.3.2) Case of $j = 0$:

(2.3.2.1) When i is an odd number:

- Produce a dummy $r := R(0, i)$
- Set $A_{j[i]} := r$
(Assign r to node($0, i$)).
- Set $b_j := \text{true}$.
- Increase i_j by increment of 1.

(2.3.3) Case of $0 < j \leq k$:

(2.3.3.1) When $i = r(j)$:

(when node(j, i) is on $\text{rtPath}(k, 0, n-1)$):

(2.3.3.1.1) $x_0 := A_{j-1}[\text{index}(\text{leftChild } (j, i))]$

(Set x_0 to an assigned value for left-child of node(j, i).)

(2.3.3.1.2) $x_1 := A_{j-1}[\text{index}(\text{rightChild } (j, i))]$

(Set x_1 to an assigned value for right-child of node(j, i).)

(2.3.3.1.3) Calculate $x_2 := h(x_0 \parallel x_1)$

(2.3.3.1.4) Set $A_{j[i]} := x_2$

(Assign x_2 to node(j, i)).

(2.3.3.1.5) When i is an even number and $j < k$:

- Increase i by increment of 1.

- Calculate $r := R(j, i)$ and Set $A_{j[i]} := r$

(Assign r to node(j, i)).

- Set $b_j := \text{true}$.

- Set $i_j := i + 1$

(2.3.3.2) When $i = r(j) + 1$, an odd number and $j < k$:

- Calculate $r := R(j, i)$ and Set $A_{j[i]} := r$

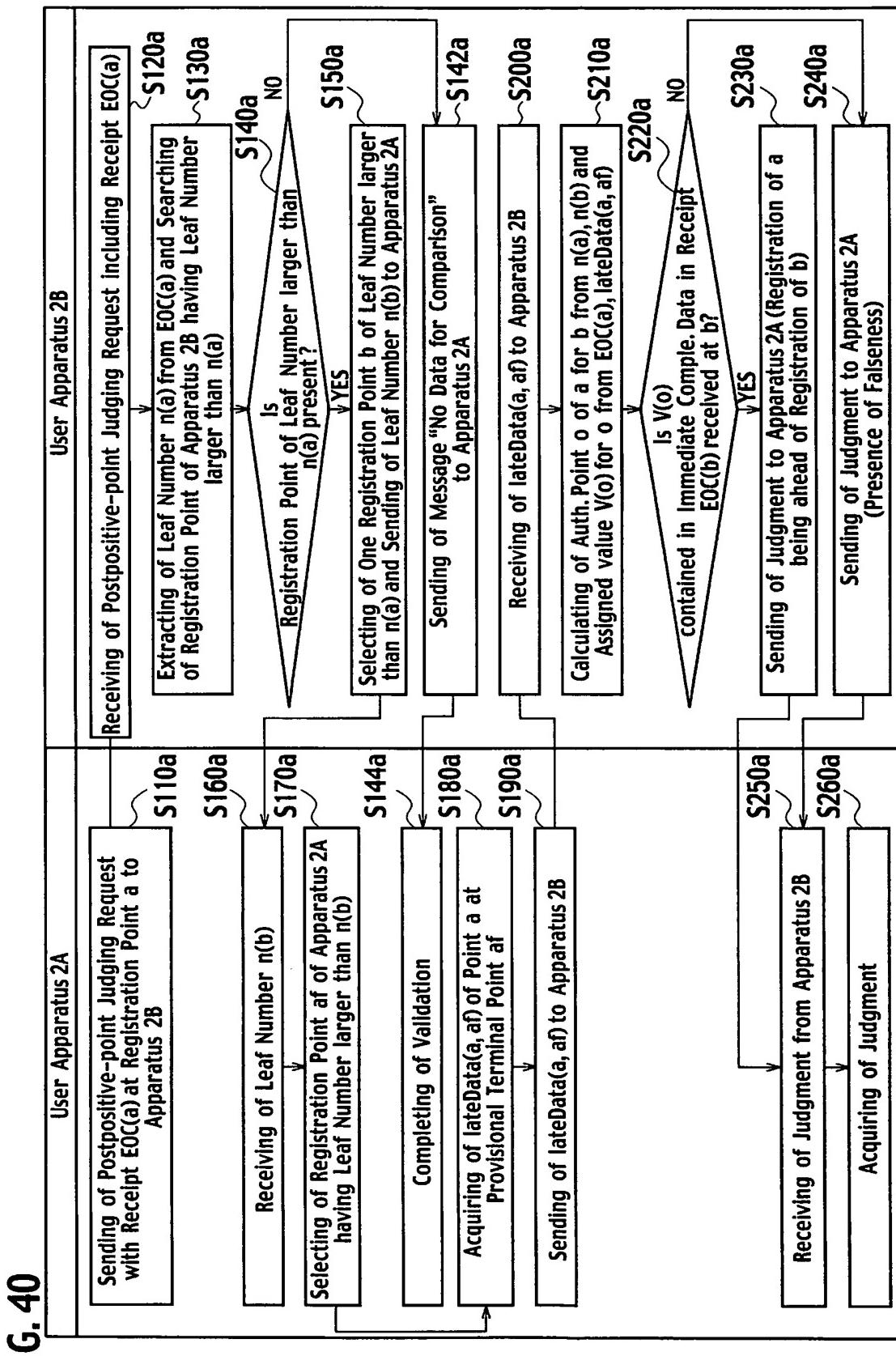
(Assign r to node(j, i)).

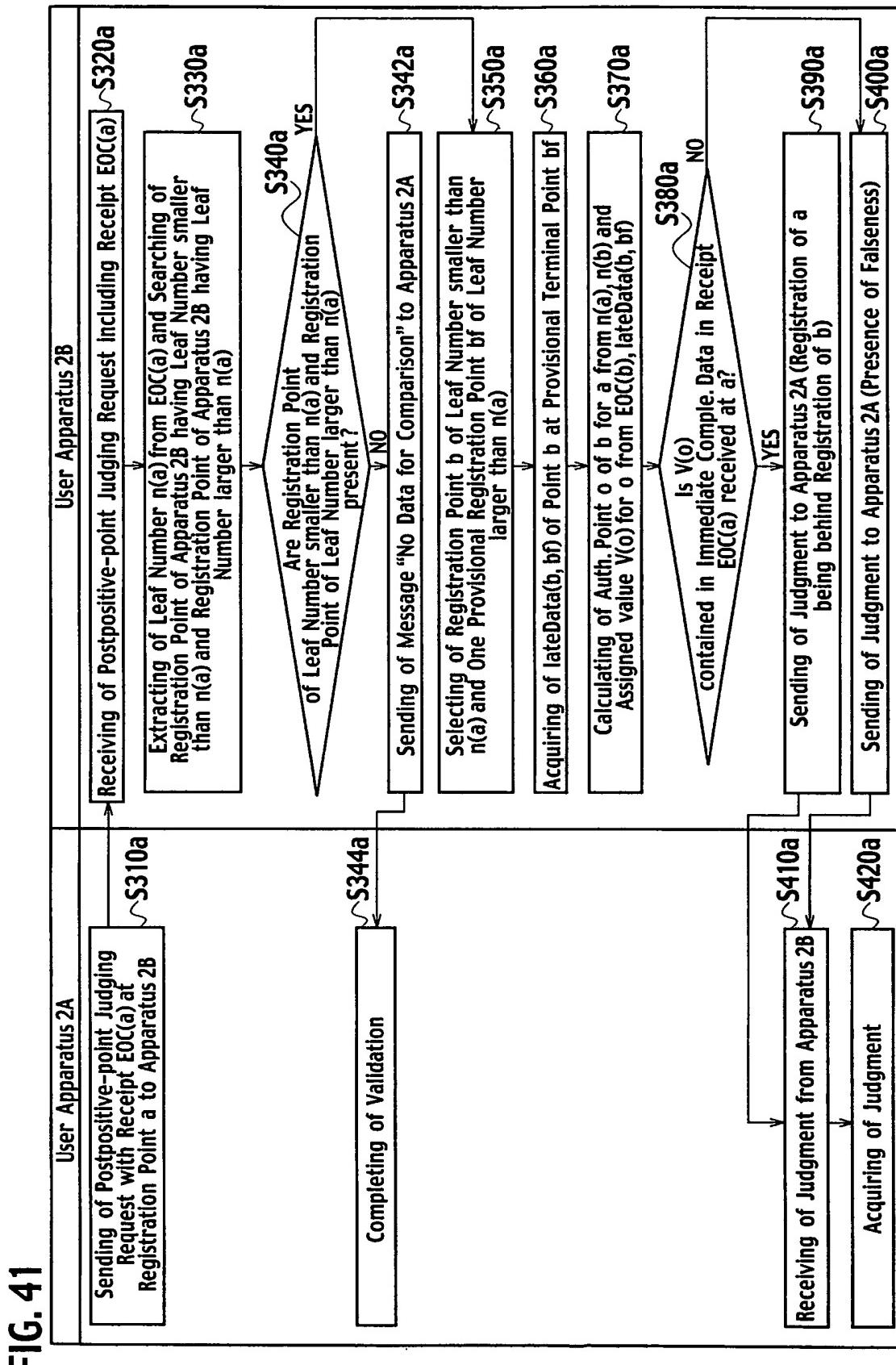
- Set $b_j := \text{true}$.

- Increase i_j by increment of 1.

Completion of loop 3

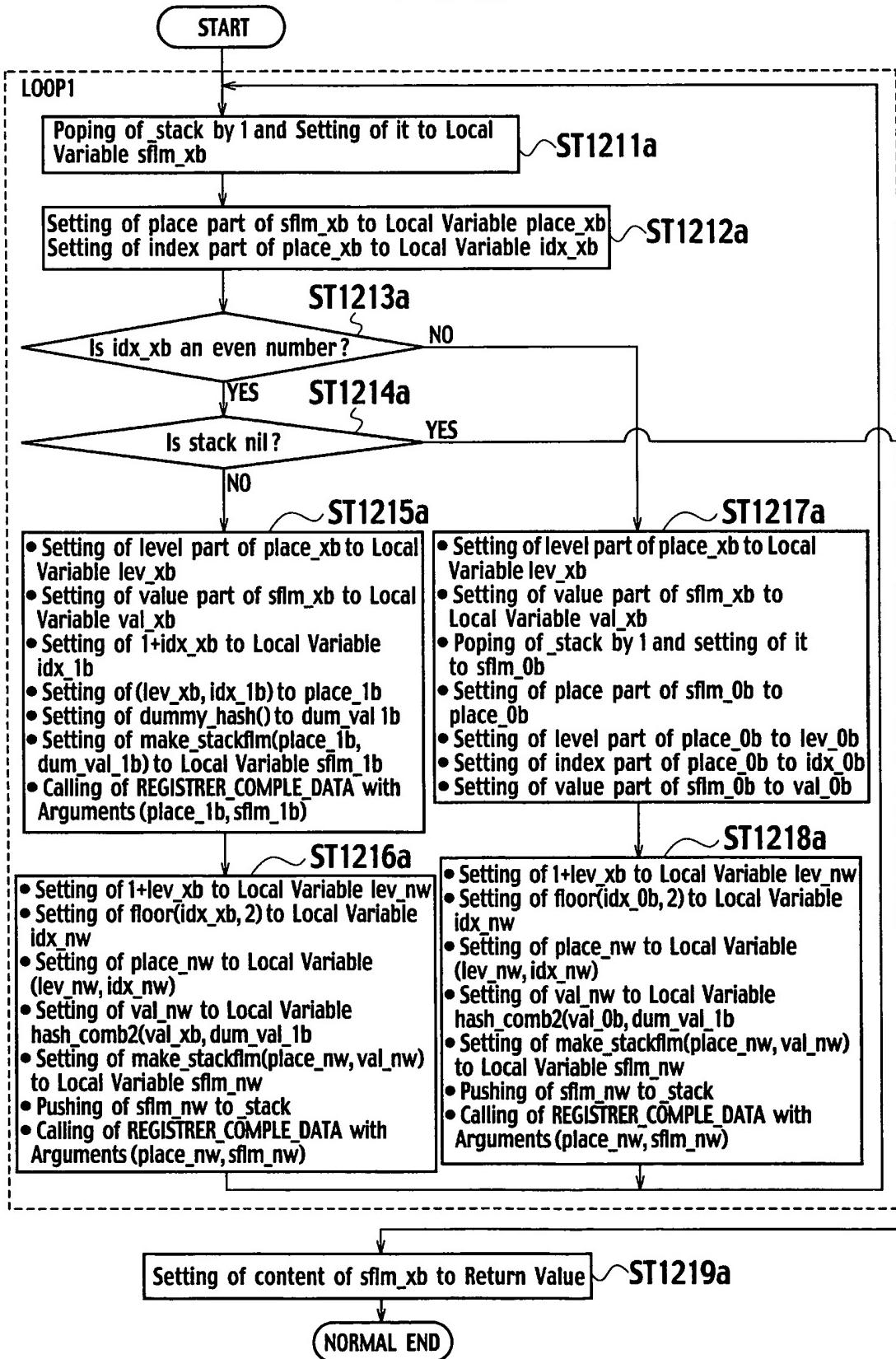
Processing Procedure 2





49 / 77

FIG. 55



60 / 77

FIG. 66

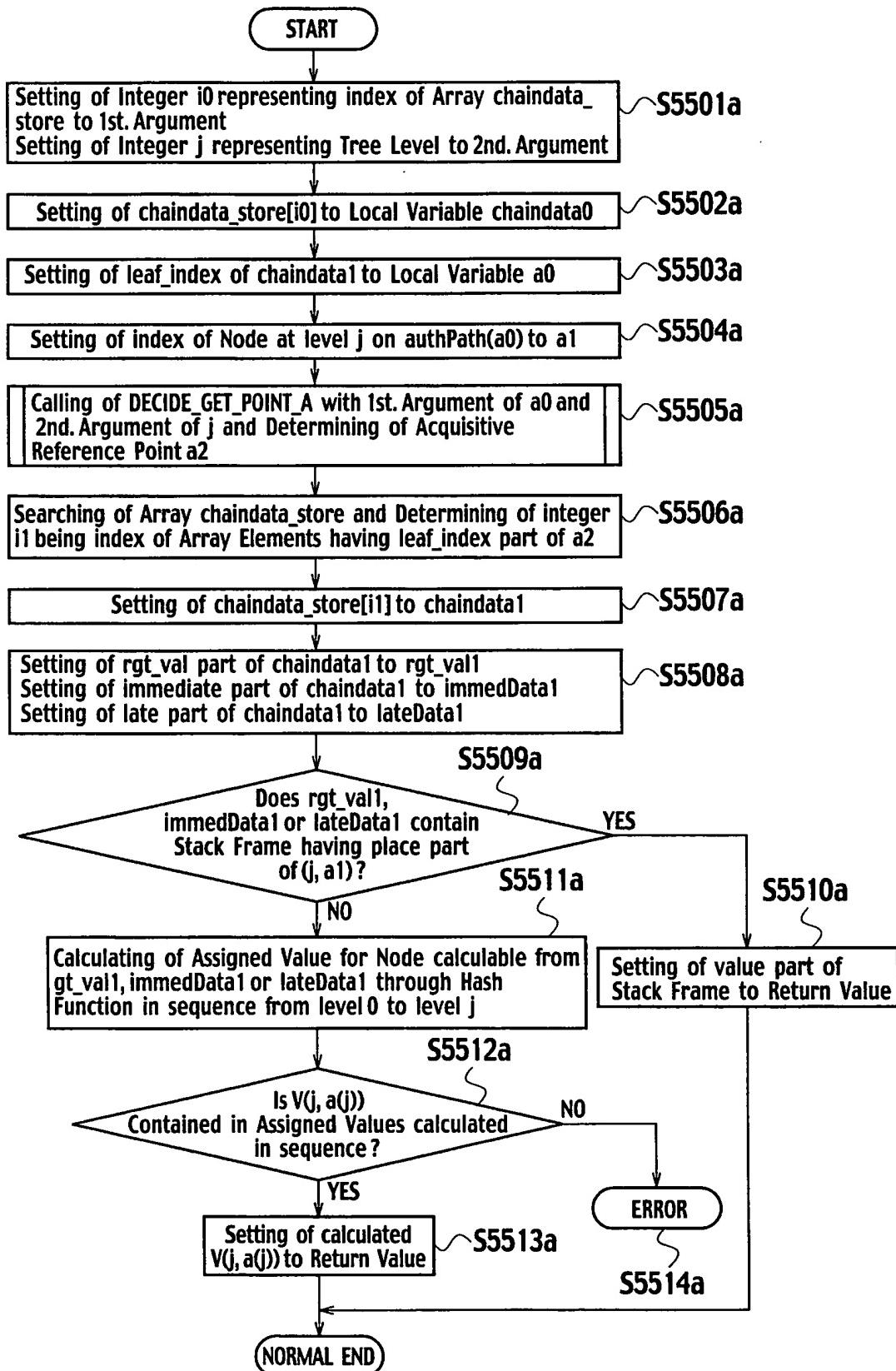
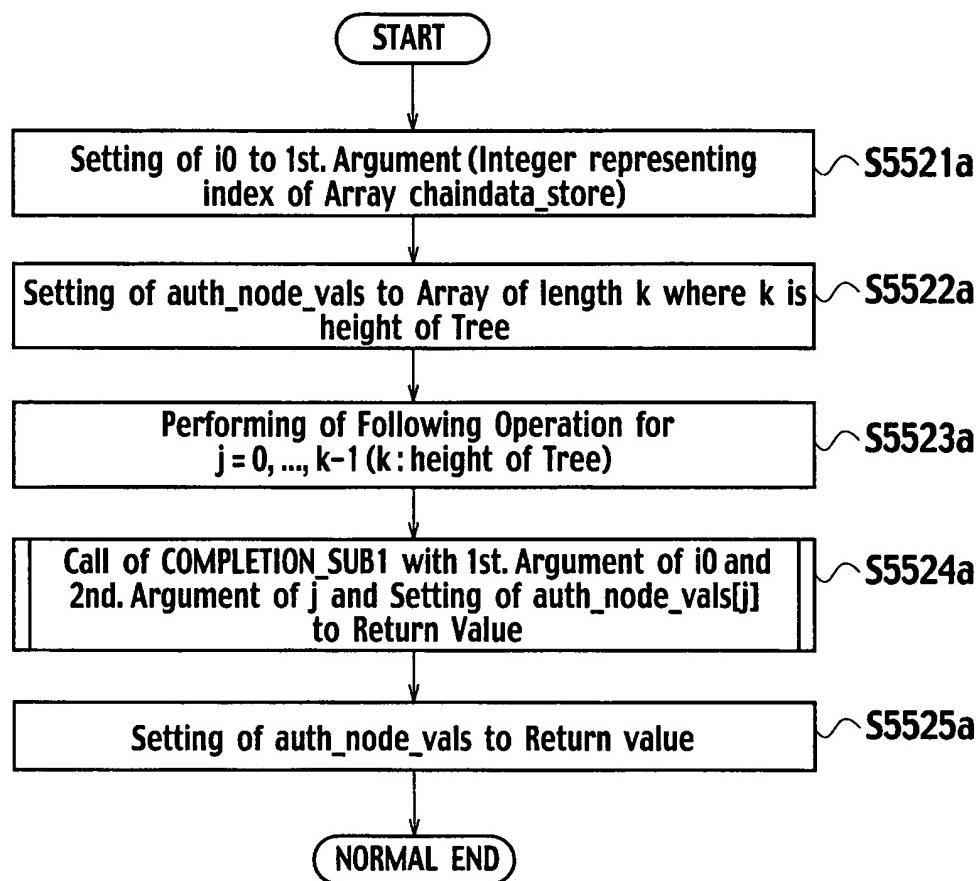
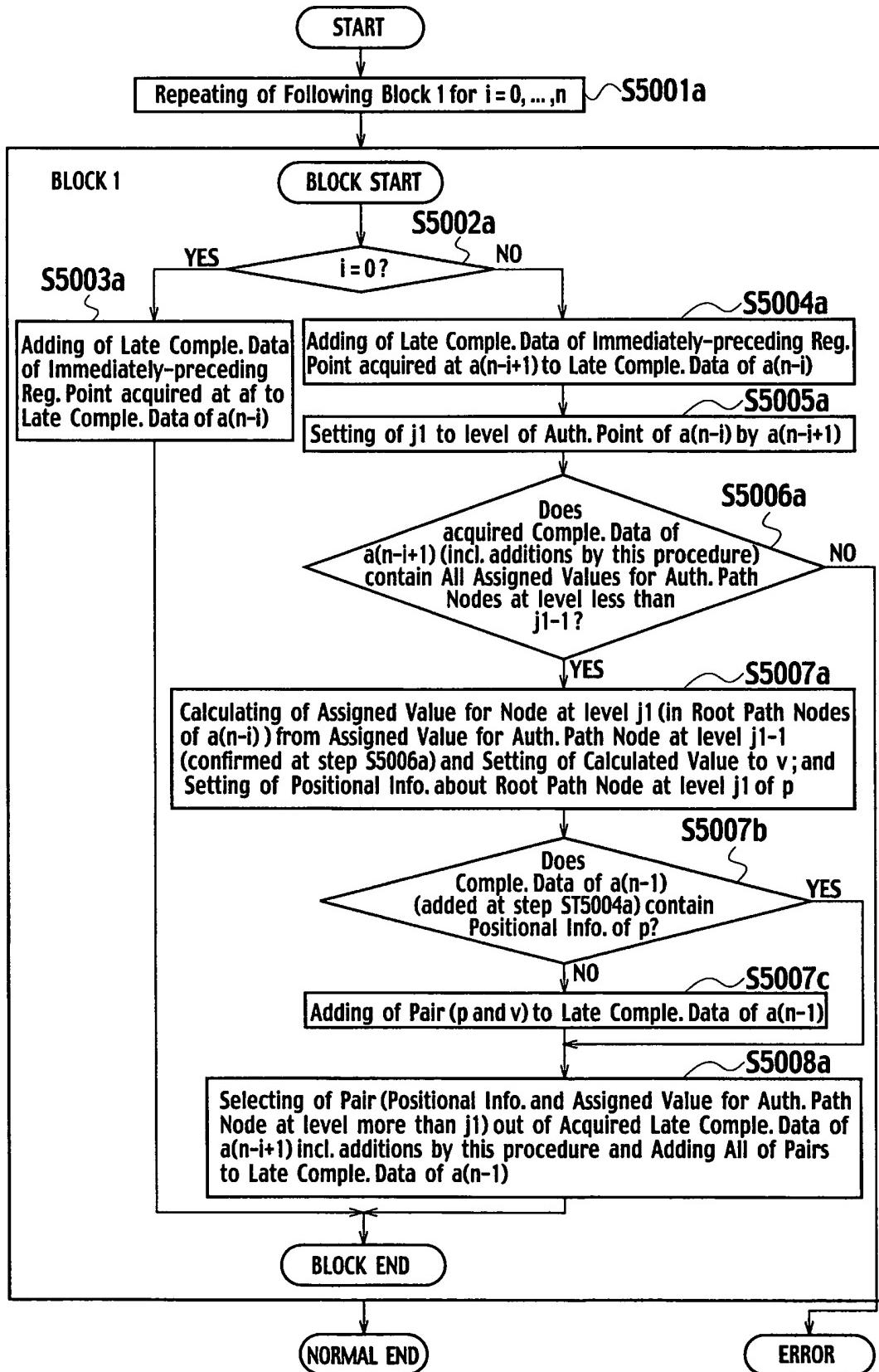


FIG. 67



62 / 77
FIG. 68



70 / 77

FIG. 76

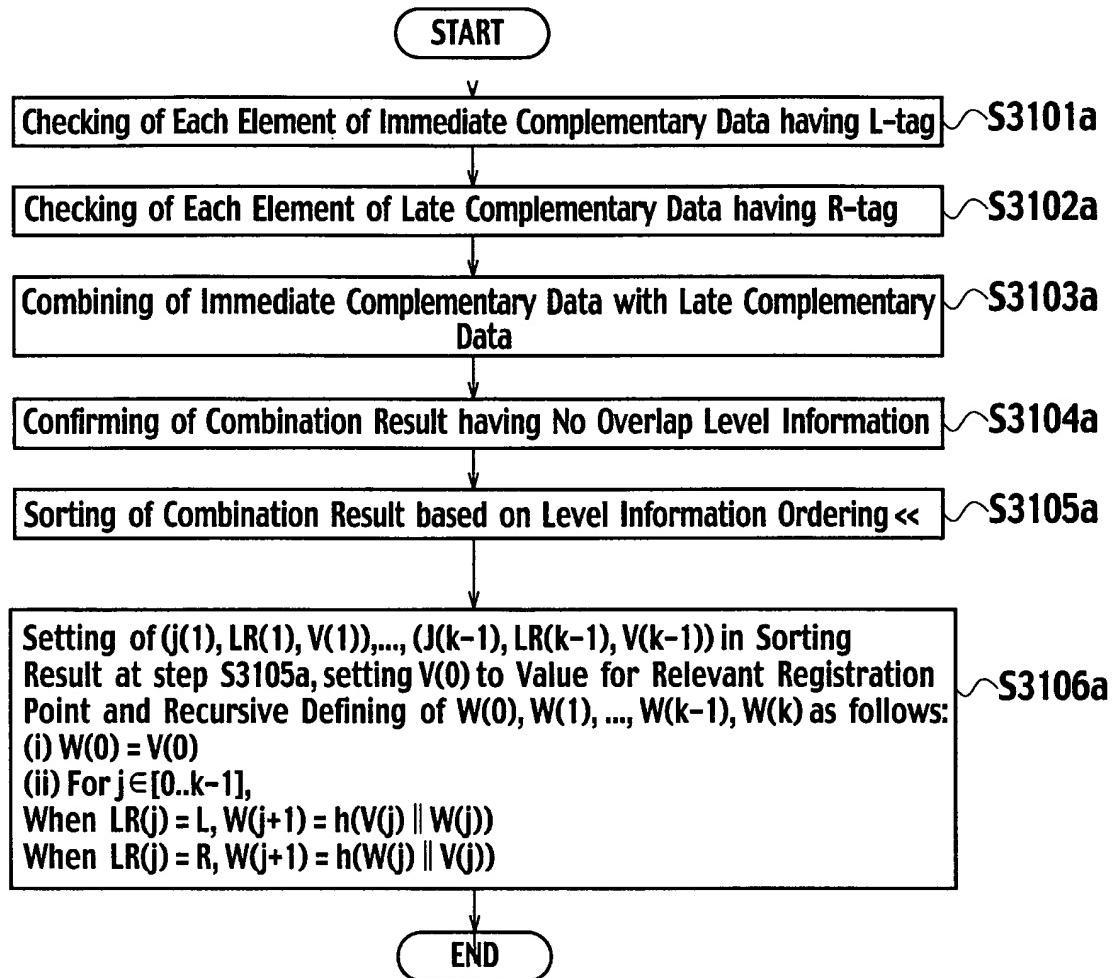


FIG. 77

